

## **IOWA HIGHWAY RESEARCH BOARD (IHRB)**

*Minutes of December 11, 2014*

### **Regular Board Members Present**

K. Jones  
M. Kennerly  
S. Okerlund  
R. Knoche  
D. Schnoebelen  
W. Weiss

D. Miller  
K. Mayberry  
L. Roehl  
R. Fangmann  
T. Wipf

### **Alternate Board Members Present**

D. Claman  
D. Sprengeler  
P. Mouw

### **Members with No Representation**

### **Secretary – V. Goetz**

### **Visitors**

Jacob Thorius  
Donna Buchwald

Washington County  
Iowa Department of Transportation

The meeting was held at the Iowa Department of Transportation Ames Complex, Materials East/West Conference Room, on Thursday, December 11, 2014. The meeting was called to order at 1:00 p.m. by Chairperson Kevin Mayberry with an initial number of 13 voting members/alternates at the table.

### **Minutes**

#### **1. No Agenda Modifications**

#### **2. Motion to approve Minutes from the October 31, 2014 meeting**

**Motion to Approve by 1<sup>st</sup> L. Roehl 2<sup>nd</sup> R. Fangmann**

Motion carried with 13 Aye, 0 Nay, 0 Abstaining.

**\*\*\*1 member joined the table. Total voting members = 14**

**3. FINAL REPORT, TR-666, "Investigation of Field Corrosion Performance and bond/Development Length of Galvanized reinforcing Steel", Brent Phares, ISU/InTrans, (\$65,805)**

**BACKGROUND**

In reinforced concrete systems, ensuring that a good bond between the concrete and the embedded reinforcing steel is critical to long-term structural performance. Without good bond between the two, the system simply cannot behave as intended.

The bond strength of reinforcing bars is a complex interaction between localized deformations, chemical adhesion, and other factors. Coating of reinforcing bars, although sometimes debated, has been commonly found to be an effective way to delay the initiation of corrosion in reinforced concrete systems.

For many years, the standard practice has been to coat reinforcing steel with an epoxy coating, which provides a barrier between the steel and the corrosive elements of water, air, and chloride ions.

**OBJECTIVE**

The primary objectives of this study were to investigate the difference in bond strength and development length between galvanized reinforcing steel and epoxy-coated bars by means of beam end tests and to instrument a bridge with sensors to evaluate, over long periods of time, the field performance of the galvanized reinforcing steel used in the bridge.

This study was not intended to define a new design method or an independent relationship for each specimen tested. It was intended to compare, in a relative manner, the bond strength of concrete-to-galvanized reinforcing steel to concrete-to-epoxy-coated bars.

The field monitoring portion of this project was not intended to provide any immediate answers regarding the corrosion resistance of galvanized reinforcing steel. Rather, the intent of this portion of the project was to take advantage of a unique opportunity to monitor the corrosion resistance of galvanized reinforcing steel using the construction of this demonstration bridge.

**Discussion:**

Q. How do galvanized rebar compare with epoxy as far as cost? How do they compare to stainless steel?

A. They are very similar in cost. Stainless steel is more expensive.

Q. How does the galvanized rebar compare with stainless steel in service length?

A. A good question but I do not know the answer.

Q. Has the Department of Transportation done any galvanized-coated bars on any bridges?

A. Yes, the Department of Transportation did a bridge in the early 80's.

Q. Talking about epoxy coating the galvanized steel, if the galvanizing is sacrificial what would be the benefit of epoxy coating?

A. It provides you a barrier before the chemicals get to the galvanized steel.

**Motion to Approve** by 1st K. Jones. 2nd R. Knoche

Motion carried with 14 Aye, 0 Nay, 0 Abstaining.

**4. FINAL REPORT, TR-640, "Guidance for Improving foundation Layers to Increase Pavement Performance on Local Roads", Tom Cackler, ISU/InTrans, (\$150,000)**

**BACKGROUND**

It is common for local street and highway pavements to be constructed from PCC supported on a natural subgrade without considering or using a subgrade stabilized treatment or support layer such as an aggregate subbase. When support layers are considered, they typically serve as a construction platform and improve the level of stability and uniformity for the pavement foundation which can result in increased performance and thus increased pavement life. An aggregate subbase can also improve the drainage under the pavement, minimizing the deterioration caused by water entrapment. The question is how much do they benefit the pavement and is the benefit worth the costs, particularly if the pavement is meeting the design life.

To find answers, field research was conducted on 16 local road sites across the state of Iowa to better understand the effects of aggregate subbases. Before recommendations could be formulated into a guide, what was *understood before* the TR-640 study and what was *learned from* the TR-640 study needed to be examined.

**OBJECTIVE**

The purpose of the Iowa Highway Research Board-sponsored research project TR-640 was to better understand how to optimize local pavement foundation support layers in order to understand pavement performance. The project consisted of a field study and the development of a user guide based on the information from the field study. Although the study focused on concrete pavements, the findings and conclusions apply also to asphalt pavements—perhaps even more so, since asphalt pavements depend on a strong subbase system. The site field research and design options covered in this study are for concrete pavements.

The project's objectives were to do the following:

**1. Determine the level of increased performance when Portland Cement Concrete (PCC) is placed on granular subbase or treated subgrade and quantify the performance and cost effectiveness.** Field data was collected on 16 existing PCC pavements to measure in situ foundation parameters and compare them to design assumptions. The 16 Iowa sites, ranging in age from 1 to 42 years, were tested using a falling weight deflectometer, dynamic cone penetrometer, along with permeability testing, physical sampling and pavement condition assessments. The TR-640 field study was completed in May 2014 by the Center for Earthworks Engineering with assistance from the National Concrete Pavement Technology Center, both located at the Institute for Transportation at Iowa State University.

**2. Develop a user guide for various traffic, soils and pavement factors for optimized performance and financial benefits.** This user guide, utilizing the information from the TR-640 field study, was developed to fulfill the second objective of TR-640.

**Discussion:**

Q. What field measurements are made now?

A. Observation and best practices if you see areas running off. Some of the utility back fill, there was visual monitoring we did not see if there was any dense testing.

**Motion to Approve** by 1st R. Fangmann. 2nd D. Schnoebelen

Motion carried with 14 Aye, 0 Nay, 0 Abstaining.

Implementation discussion: This information will be reviewed and proposed to be included in a 2016 Revision to the SUDAS specifications. Also, promote increase use of DCP testing on projects.

**5. Funds and time Extension request TR-655: Updating the Iowa Culvert hydraulics and Iowa Bridge backwater Software, LaDon Jones, (\$6,300).**

**BACKGROUND**

The Iowa Highway Research Board has previously funded the development of software used for the hydraulic design of culverts (Iowa Culvert Hydraulics: TR-447, TR-504) and estimation of the backwater due to bridges (Iowa Bridge Hydraulics Software: TR-476, TR-564). The first version of the culvert software was released in 2001 and the first version of the bridge software was released in 2003. The software is used by the Iowa Department of Transportation, Iowa County Engineering Offices and consultants.

**OBJECTIVE**

Both software programs include the same two methods for estimating the design flowrates, for various return period,s at ungagged sites. The methods are based on reports from the U.S.G.S. on regression results between measured flowrates at gaged sites and drainage area, by region (Lara, 1987 and Eash, 2001). The equations from Eash (2001) also include the influence of the main channel slope of the watershed and the drainage area of the watershed in the Des Moines lobe landform region.

The U.S.G.S. is in the process of updating their equations for estimating flowrates at ungaged sites in Iowa (IHRB TR-529). Neither software program currently includes the updated methodology. Estimates of design flowrates are probably the single most important parameters for culvert design and bridge backwater estimation.

The Iowa Department of Transportation is in the process of changing culvert standards and the associated losses associated with culverts. These updated standards and losses are not reflected in the current Culvert software.

The Iowa Department of Natural Resources, which uses the Bridge Backwater Program, has found the rating curve produced from the software produces slightly difference results from another program they use for rating curves.

Both software programs were written in Visual Basic 6.0. Visual Basic 6.0 is no longer supported by Microsoft and the language is no longer being updated nor service packs released to fix known problems. Although the programs will run under Windows 7 there are sometimes problems with getting the programs installed and these problems may increase in the future. Future updates to the visual basic 6.0 code base for the software would not be able to take advantage of improvements in the Microsoft programming environment.

Since additions to the software are needed to add the U.S.G.S. flowrate equations and update the culvert information, this would also be a good time to update the software itself.

**Discussion:**

Q. What changed and why the increase in funding?

A. We added new features, different culvert sizes and the USGS equations were not part of the original proposal.

**Motion to Approve by 1<sup>st</sup> R. Knoche.2<sup>nd</sup> D. Miller.**

Motion carried with 14 Aye, 0 Nay, 0 Abstaining

**6. Funds and Time Extension request TR-665: Mitigation of Sedimentation at Multi-Box culverts, Marian Muste, U of I, (\$83,633).**

**BACKGROUND**

These investigators have conducted a preliminary culvert sedimentation analysis applied to four different soils areas in Iowa (labeled as A, B, C and D). In each of these areas, a dozen of two-box culverts were searched for the degree of sedimentation as enabled by aerial images. The sediment deposits were quantified using two representative ratios estimated from the images the stream-to-culvert width ratio sediment-covered width to total culvert width ratio. This preliminary analysis results indicate that there are obvious correlations between the sediment deposit extent and stream-to-culvert ratio as well as soil erodability

**OBJECTIVE**

The overall project objective is to systematically identify the likelihood of culvert sedimentation as a function of stream and culvert geometry along with the soil characteristics of the area drained by the culvert. The conceptualized relationships will be expressed analytically for their use in conjunction with the current culvert design specifications used by IDOT and county engineers. The following specific goals will be integral part of the proposed study:

1. Conduct the analysis on aerial photographs on a significant sample of 2- and 3-box culverts located in various soil areas throughout the state
2. Estimate the rates of sedimentation using previous aerial photographs
3. Conduct field surveys to accurately quantify sedimentation volumes, the origin of the materials (core analysis), and additional factors involved in sedimentation
4. Develop analytic relationships to capture:
  - a. the functional relationship between stream-to-culvert ratios and soil erodibility
  - b. the rate of sedimentation for various soil erodibility factors
5. Develop matrix for complementing the culvert design process
6. Review culvert design specifications and formulate provisions to account for local soil characteristics in the design of culverts

**Discussion:**

Q. Are we waiting for the current USGS research by David Eash?

A. Yes, we are waiting for the results of the small basin research project from Eash. From the Department of Transportation's perspective to determine what our policy will be for estimating peak flow from small basins between 2 and 20 square miles.

**Motion to Approve by 1<sup>st</sup> W. Weiss. 2<sup>nd</sup> P. Mouw.**

Motion carried with 14 Aye, 0 Nay, 0 Abstaining

**7. Annual Report**

We have submitted the Annual Report as required. You should have received a copy by e-mail and is also available on our research website.

On the Secondary road research funds, according to the finance system it shows we obligated \$870,000 dollars' worth of research but there were several research projects in 2014 fiscal year that we approved that have not yet shown up in the obligation.

In fiscal year 2014 we obligated a total of 1.5 million dollars' worth of secondary road funds.

The Street funds total \$195,000 and Primary road funds \$184,000 dollars for fiscal year 2014.

Sixteen projects were initiated in fiscal year 2014 and six projects that were actually finalized with a final report.

Any project that is currently active has a one page description on the report so all of the new ones have been added and the old have been taken off. Any projects that are still active are included in the report; it also has a table report of expenditures that is different from obligations.

## **8. New Business**

Sara Okerlund was appointed by the APWA to serve another term as a city representative.

Russ Stutt is the new District 1 member, and Paul Geilenfeldt from Marshall County will serve as alternate.

Kevin Mayberry has been appointed to serve another term as the District 4 rep. Brad Skinner from Montgomery County will serve as alternate.

DOT Management team is now going to be involved in selecting representatives for the IHRB.

Currently we don't know if Bob Younie will remain as a rep and continue for another term.

## **9. Adjourn**

**The next meeting of the Iowa Highway Research Board will be held Friday February 27, 2015, in the East/West Materials Conference Room at the Iowa DOT. The meeting will begin promptly at 9 a.m.**



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**Vanessa Goetz, IHRB Secretary**